This is a Class 1 exam

Lebanon Evangelical School
for Boys and Girls
Loucizeh - Baabda

Stage Exam 04

27MAR2023

Do NOT write in this box. Your MARK will be placed here.

Subject :	A Level : Maths M1Pure
Class :	11A and 12A
Teacher :	Mrs. Claudine Eid
Duration :	40 minutes
Calculators are allowed	

Your name :		*Time taken to complete exam*
Your Class :		
Exam Room :		
How many sheets, including cover sheet :		

- Do not open this paper until the teacher in charge instructs you to do so.
- The most important thing to remember in taking an exam is NEVER PANIC.
- If you are caught cheating in this exam, you will be awarded zero for ALL exams that are taken on this day.

Answer ALL questions. Write your answers in the space provided

(1) Using the laws of logarithms, solve

$$\log_3 (32 - 12x) = 2 \log_3 (1 - x) + 3$$

(5)

$\log_3(32-12x) - \log_3(1-x)^2 = 3$

$\log_3\left(\frac{32-12x}{1-2x+x^2}\right) = 3$ [1]

$\frac{32-12x}{1-2x+x^2} = 27$ [1]

$27 - 54x + 27x^2 = 32 - 12x$

$27x^2 - 42x - 5 = 0$ [1]

$x = \frac{5}{3}$ rejected [1]

$x = -\frac{1}{9}$ accepted [1]

(Total for Question1 is 5 marks)

(2) Find the first four terms, in ascending powers of x, of the binomial expansion of

$$\left(2+\frac{3}{8}x\right)^{10}$$

Give each coefficient as an integer.

(4)

$$\binom{10}{0}2^{10}\left(\frac{3x}{8}\right)^0 + \binom{10}{1}2^9\left(\frac{3x}{8}\right) + \binom{10}{2}2^8\left(\frac{3x}{8}\right)^2$$

$$+ \binom{10}{3}2^7\left(\frac{3x}{8}\right)^3$$

$$= 1024 + 1920x + 1620x^2 + 810x^3$$

[1] [1] [1] [1]

(Total for Question2 is 4 marks)

(3) (*a*) Find the first three terms, in ascending powers of x, of the binomial expansion of

$$(2+px)^6$$

where p is a constant. Give each term in simplest form.

(4)

Given that in the expansion of

$$\left(3-\frac{1}{2}x\right)(2+px)^6$$

the coefficient of x^2 is $-\frac{3}{4}$

(*b*) find the possible values of p.

(4)

[1]

$$(2+px)^6 = \binom{6}{0}2^6(px)^0 + \binom{6}{1}2^5(px) + \binom{6}{2}2^4(px)^2$$

$$= 64 + 192px + 240p^2x^2$$

[1] [1] [1]

Continue 3

$3(240p^2x^2) - \frac{1}{2} \times (192px)$

$720p^2x^2 - 96px^2 = -\frac{3}{4}x^2$ [1]

$720p^2 - 96p + \frac{3}{4} = 0$ [1]

$p = \frac{1}{8}$ or $p = \frac{1}{120}$

[1] [1]

(Total for Question3 is 8 marks)

(4) A circle has equation

$$x^2 - 6x + y^2 + 8y + k = 0$$

where k is a positive constant.

Given that the x-axis is a tangent to this circle,

(a) find the value of k.

(3)

The circle meets the coordinate axes at the points R, S and T.

(b) Find the exact area of the triangle RST.

(4)

Center $(3, -4)$ [1]

Radius $= \sqrt{9+16-k} = 4$ [1]

$25 - k = 16$

$k = 9$ [1]

$$x^2+y^2-6x+8y+9=0$$

x int $\Rightarrow y=0 \Rightarrow x^2-6x+9=0$

Continue 4

$x=3$ [1]

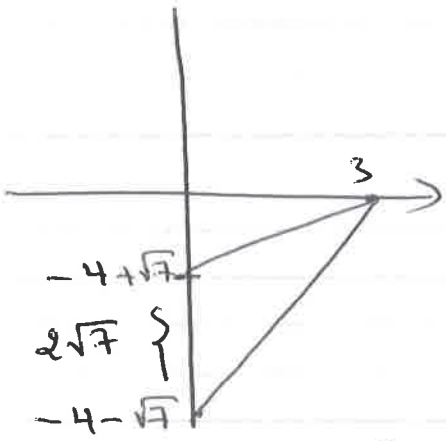
$y_{int} \Rightarrow x=0 \Rightarrow y^2+8y+9=0$

$y_1=-4+\sqrt{7}$ [1]

$y_2=-4-\sqrt{7}$

[1] [1]

$$\text{Area}=\frac{2\sqrt{7}\times 3}{2}=3\sqrt{7}\ \text{units}^2$$



$-4+\sqrt{7}-(-4-\sqrt{7})=2\sqrt{7}$

(Total for Question4 is 7 marks)

(5) (*a*) Show that the equation

$$8 \tan \theta = 3 \cos \theta$$

may be rewritten in the form

$$3 \sin^2 \theta + 8 \sin \theta - 3 = 0$$

(3)

(*b*) Hence find the exact value of $\sin \theta$, $\cos \theta$, $\tan \theta$, for $0 \leq \theta \leq 180°$, the equation

$$8 \tan \theta = 3 \cos \theta$$

(4)

$$\frac{8 \sin \theta}{\cos \theta} = 3 \cos \theta$$

$$8 \sin \theta = 3 \cos^2 \theta$$

$$3(1 - \sin^2 \theta) = 8 \sin \theta$$

$$3 \sin^2 \theta + 8 \sin \theta - 3 = 0$$

$\sin \theta = \frac{1}{3}$ or $\sin \theta = -3$

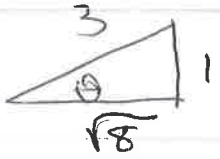
accepted rejected

Continue 5

$\sin\theta = \frac{1}{3}$ accepted [1]

$\sin\theta = -3$ rejected [1]

$\sin\theta = \frac{1}{3}$



quad I

$\cos\theta = \frac{2\sqrt{2}}{3}$ [1]

$\tan\theta = \frac{1}{2\sqrt{2}}$

quad II

$\cos\theta = -\frac{2\sqrt{2}}{3}$ [1]

$\tan\theta = -\frac{1}{2\sqrt{2}}$

(Total for Question5 is 7 marks)

TOTAL FOR PAPER IS 31 MARKS